

CLAIMS

What is claimed is:

1. A method for interpolating a pixel value for a blank pixel location in a field from an interlaced video stream, the method comprising:

selecting a boundary pixel grouping comprising a common-field pixel and a cross-field pixel;
generating a weighted average from the boundary pixel grouping; and

assigning the weighted average to the blank pixel location.

2. The method of Claim 1, wherein the boundary pixel grouping consists of a common-field pixel pair comprising the common-field pixel and a cross-field pixel pair comprising the cross-field pixel, wherein both the common-field pixel pair and the cross-field pixel pair surround the blank pixel location.

3. The method of Claim 2, wherein generating the weighted average comprises:

multiplying a luminance of a bottom pixel in the common-field pixel pair by a weighting coefficient to generate a first interpolated portion;

multiplying a first cross-field luminance value by a complement of the weighting coefficient to generate a second interpolated portion, wherein the first cross-field luminance value is based on a luminance value of the cross-field pixel; and

adding the first interpolated portion to the second interpolated portion to generate the weighted average.

4. The method of Claim 3, wherein the first cross-field luminance value is equal to the luminance value of the cross-field pixel, and wherein the cross-field pixel comprises a leading pixel in the cross-field pixel pair.

5. The method of Claim 3, wherein the first cross-field luminance value is equal to the luminance value of the cross-field pixel, and wherein the cross-field pixel comprises a trailing pixel in the cross-field pixel pair.

6. The method of Claim 3, wherein the cross-field pixel comprises a leading pixel in the cross-field pixel pair, wherein the cross-field pixel pair further comprises a trailing pixel, and wherein the first cross-field luminance value is equal to an average of the luminance value of the cross-field pixel and a luminance value of the trailing pixel.

7. The method of Claim 3, wherein the weighting coefficient is between 0 and 0.5.

8. The method of Claim 3, further comprising:

 multiplying a luminance of a top pixel in the common-field pixel pair by the complement of the weighting coefficient to generate a first adjustment portion;

 multiplying a second cross-field luminance value by the weighting coefficient to generate a second adjustment portion, wherein the second cross-field luminance value is based on a luminance value of the cross-field pixel;

 adding the first adjustment portion to the second adjustment portion to generate a modified luminance value;
and

replacing the luminance of the top pixel with the modified luminance value.

9. The method of Claim 8, wherein the second cross-field luminance value is equal to the luminance value of the cross-field pixel, and wherein the cross-field pixel comprises a leading pixel in the cross-field pixel pair.

10. The method of Claim 8, wherein the second cross-field luminance value is equal to the luminance value of the cross-field pixel, and wherein the cross-field pixel comprises a trailing pixel in the cross-field pixel pair.

11. The method of Claim 8, wherein the cross-field pixel comprises a leading pixel in the cross-field pixel pair, wherein the cross-field pixel pair further comprises a trailing pixel, and wherein the second cross-field luminance value is equal to an average of the luminance value of the cross-field pixel and a luminance value of the trailing pixel.

12. A method for de-interlacing an interlaced video signal, the video signal comprising a plurality of fields, each field comprising a plurality of original pixels and a plurality of blank pixel locations, the method comprising applying an interpolation algorithm to generate a pixel value for each blank pixel location in each field, wherein applying the interpolation algorithm comprises:

determining whether the blank pixel location is associated with a moving state or a still state;

applying a pure 2D de-interlacing algorithm to generate the pixel value for the blank pixel location when the blank pixel location is associated with the moving state; and

applying a mixed 2D-3D de-interlacing algorithm to generate the pixel value for the blank pixel location when the blank pixel location is associated with the still state.

13. The method of Claim 12, wherein applying the mixed 2D-3D de-interlacing algorithm comprises:

- selecting a boundary pixel grouping comprising a common-field pixel and a cross-field pixel;
- generating a weighted average from the boundary pixel grouping; and
- assigning the weighted average to the blank pixel location.

14. The method of Claim 13, wherein the boundary pixel grouping consists of a common-field pixel pair comprising the common-field pixel and a cross-field pixel pair comprising the cross-field pixel, wherein both the common-field pixel pair and the cross-field pixel pair surround the blank pixel location.

15. The method of Claim 14, wherein assigning the weighted average comprises:

- multiplying a luminance of a bottom pixel in the common-field pixel pair by a weighting coefficient to generate a first interpolated portion;
- multiplying a first cross-field luminance value by a complement of the weighting coefficient to generate a second interpolated portion, wherein the first cross-field luminance value is based on a luminance value of the cross-field pixel; and
- adding the first interpolated portion to the second interpolated portion to generate the weighted average.

16. The method of Claim 15, wherein the first cross-field luminance value is equal to the luminance value of the cross-field pixel, and wherein the cross-field pixel comprises a leading pixel in the cross-field pixel pair.

17. The method of Claim 15, wherein the first cross-field luminance value is equal to the luminance value of the cross-field pixel, and wherein the cross-field pixel comprises a trailing pixel in the cross-field pixel pair.

18. The method of Claim 15, wherein the cross-field pixel comprises a leading pixel in the cross-field pixel pair, wherein the cross-field pixel pair further comprises a trailing pixel, and wherein the first cross-field luminance value is equal to an average of the luminance value of the cross-field pixel and a luminance value of the trailing pixel.

19. The method of Claim 15, wherein the weighting coefficient is between 0 and 0.5.

20. The method of Claim 15, further comprising:

 multiplying a luminance of a top pixel in the common-field pixel pair by the complement of the weighting coefficient to generate a first adjustment portion;

 multiplying a second cross-field luminance value by the weighting coefficient to generate a second adjustment portion, wherein the second cross-field luminance value is based on a luminance value of the cross-field pixel;

 adding the first adjustment portion to the second adjustment portion to generate a modified luminance value;
and

replacing the luminance of the top pixel with the modified luminance value.

21. The method of Claim 20, wherein the second cross-field luminance value is equal to the luminance value of the cross-field pixel, and wherein the cross-field pixel comprises a leading pixel in the cross-field pixel pair.

22. The method of Claim 20, wherein the second cross-field luminance value is equal to the luminance value of the cross-field pixel, and wherein the cross-field pixel comprises a trailing pixel in the cross-field pixel pair.

23. The method of Claim 20, wherein the cross-field pixel comprises a leading pixel in the cross-field pixel pair, wherein the cross-field pixel pair further comprises a trailing pixel, and wherein the second cross-field luminance value is equal to an average of the luminance value of the cross-field pixel and a luminance value of the trailing pixel.

24. The method of Claim 13, wherein determining whether the blank pixel location is associated with the moving state or the still state comprises detecting at least one of a plurality of state bits, each of the state bits indicating a pixel state for each pixel in the boundary pixel grouping.